

July 1, 2005

CURRICULUM VITAE

NAME:	Walter J. Storkus, Ph.D.	BIRTH DATE:	February 10, 1959
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EDUCATION AND TRAINING

UNDERGRADUATE:

1977-1981	Brandeis University Waltham, MA 02154	B.A.	Biochemistry Mathematics
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GRADUATE:

1982-1986	Duke University Durham, NC 27710	Ph.D.	Microbiology/ Immunology
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Thesis: "NK Regulation of B cell Development"
Advisor: J.R. Dawson, Ph.D.

POST-GRADUATE:

1986-1987	Department of Microbiology and Immunology, Duke University Med. Ctr. Durham, NC 27710.	NIH Postdoctoral Fellow (J.R. Dawson, Ph.D.)
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1987-1991	Department of Microbiology and Immunology, Duke University Med. Ctr. Durham, NC 27710.	Research Associate (P. Cresswell, Ph.D./ J.R. Dawson, Ph.D.)
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APPOINTMENTS AND POSITIONS

ACADEMIC:

1985-1991	Department of Microbiology and Immunology, Duke University, Durham, NC 27710	Teaching Assistant
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1991	Departments of Surgery and Molecular Genetics and Biochemistry University of Pittsburgh Pittsburgh, PA 15261	Visiting Assistant Professor
1991-1996	Departments of Surgery and Molecular Genetics and Biochemistry University of Pittsburgh Pittsburgh, PA 15261	Assistant Professor
1997-2001	Departments of Surgery and Molecular Genetics and Biochemistry, and Pathology University of Pittsburgh Pittsburgh, PA 15261	Associate Professor (Tenure)
2001-2002	Departments of Surgery, Molecular Genetics and Biochemistry, and Pathology University of Pittsburgh Pittsburgh, PA 15261	Professor (Tenure)
2000-2004	Division of Surgical Oncology Department of Surgery University of Pittsburgh Pittsburgh, PA 15261	Head of Research
2002-2004	Departments of Surgery and Pathology University of Pittsburgh Pittsburgh, PA 15261	Professor (Tenure)
2004	Departments of Surgery, Dermatology and Immunology University of Pittsburgh Pittsburgh, PA 15261	Professor (Tenure)
2004-Present	Departments of Dermatology and Immunology University of Pittsburgh Pittsburgh, PA 15261	Professor (Tenure)

NON-ACADEMIC:

1981-1982	Department of Biochemistry Brandeis University, Waltham, MA 02154	Research Technician
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MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

1986-Present	Sigma Xi	Member
1990-Present	American Association of Immunologists	Member
1993-Present	Society of Natural Immunity	Member
1995-Present	Society of Biological Therapy	Member
2001-Present	American Association of Cancer Researchers	Member

HONORS

1999-2003	Member NIH Experimental Immunology Study Section
1995-1999	Received Cancer Research Institute Clinical Investigator Award
1996	Honored as "Outstanding Faculty" at Univ. Pittsburgh 1996 Honors Convocation, February 3, 1996.
1996	Klaus-Irmscher Lecturer, Wistar Institute, Philadelphia, PA, April 18, 1996
1997	Honored as "The 1997 Cancer Foundation of Western Australia visiting Professor of Cancer Research".

PUBLICATIONS-Refereed Articles

1. Storkus, W.J. and Dawson, J.R.: Oxygen-reactive metabolites are not detected at the effector-target interface during natural killing. *J. Leuk. Biol.* 39:547-557, 1986.
2. Storkus, W.J., Balber, A.E., and Dawson, J.R.: Quantitation and sorting of vitally stained natural killer cell-target cell conjugates by dual beam flow cytometry. *Cytometry* 7:163-170, 1986.
3. Storkus, W.J. and Dawson, J.R.: B Cell sensitivity to natural killing: correlation with target cell stage of differentiation and state of activation. *J. Immunol.* 136:1542-1547, 1986.
4. Storkus, W.J., Howell, D.N., Salter, R.D., Dawson, J.R. and Cresswell, P.: NK susceptibility varies inversely with target cell class I HLA antigen expression. *J. Immunol.* 138:1657-1659, 1987.
5. Storkus, W.J., Alexander, J., Payne, J.A., Dawson, J.R. and Cresswell, P. Reversal of NK susceptibility in target cells expressing transfected class I HLA genes. *Proc. Natl. Acad. Sci. USA*, 86:2361-2367, 1989.
6. Storkus, W.J., Alexander, J., Payne, J.A., Cresswell, P. and Dawson, J.R. The alpha-1/alpha-2 domains of class I HLA molecules confer resistance to natural killing. *J. Immunol.* 143:3853-3857, 1989.
7. Miller, M.F., Mitchell, T.G., Storkus, W.J. and Dawson, J.R. Human natural killer (NK) cells do not inhibit the growth of *Cryptococcus neoformans* in the absence of antibody. *Inf. Immun.* 58:639-645, 1990.
8. Dawson, J.R., Storkus, W.J., Alexander, J., Payne, J.A. and Cresswell, P. The alpha-1 domain of human class I molecules confers resistance to natural killing. *Cell Immunol. Immunother. Cancer*, 138:155-161, 1990.
9. Storkus, W.J., Salter, R.D., Ward, F.E., Ruiz, R.E., Cresswell, P. and Dawson, J.R. Class I-induced NK resistance in human B cell targets: Identification of non-permissive residues in HLA-A2. *Proc. Natl. Acad. Sci. USA*. 88: 5989-5992, 1991.
10. Storkus, W.J., Salter, R.D., Cresswell, P. and Dawson, J.R. Peptide-induced modulation of target cell sensitivity to natural killing. *J. Immunol.* 149: 1185-1190, 1992.
11. Storkus W. J., Zeh III, H. J., Salter R. D., Lotze, M. T. Identification of T cell epitopes: Rapid isolation of class I-presented peptides from viable cells by mild acid elution. *J. Immunother.* 14: 94-103, 1993.
12. Nastala, C.N., Edington, H.D., Storkus, W.J., and Lotze, M.T. Recombinant interleukin-12 (rmIL-12) mediates regression of both subcutaneous and metastatic murine tumors. *Surg. Forum* 44: 518-521, 1993.
13. Storkus W. J., Zeh III, H. J., Salter R. D., Lotze, M. T. Isolation of human melanoma peptides recognized by class I restricted tumor infiltrating T lymphocytes. *J. Immunol.* 151: 3719-3727, 1993.
14. Zeh, H.J., Hurd, S., Storkus, W.J., and Lotze, M.T. Interleukin 12 promotes the proliferation and cytolytic maturation of immune effectors: Implications for the immunotherapy of cancer. *J. Immunother.* 14: 155-161, 1993.
15. Zeh, H.J. III, Salter, R.D., Lotze, M.T., and Storkus, W.J.. Flow cytometric determination of peptide-class I complex formation. *Human Immunol.* 39: 79-86, 1994.
16. Tahara, H.T., Zeh H.J. III, Storkus, W.J., Pappo, I., Watkins, S.C., Gubler, U, Wolf, S.F., Robbins, P.D., and Lotze, M.T. Fibroblasts genetically engineered to secrete interleukin-12 can suppress tumor growth and induce anti-tumor immunity to a murine melanoma *in vivo*. *Cancer Res.* 54: 182-189, 1994.
17. Stuber, G., Leder, G., Storkus, W.J., Lotze, M.T., Modrow, S., Klein, E., Karre, K., and Klein, G. Identification of wild-type and mutant p53 peptides capable of binding to HLA-A2 class I molecules assessed by the T2 stabilization assay and a novel class I reconstitution assay. *Eur. J. Immunol.* 24: 765-768, 1994.
18. Nastala, C.N., Edington, H.D., McKinney, T.G., Tahara, H., Nalesnik, M, Brunda, M.J., Gately, M.K., Wolf, S.F., Schreiber, R., Storkus, W.J., and Lotze, M.T. Recombinant interleukin-12 (IL-12) administration induces tumor regression in association with interferon- γ production. *J. Immunol.* 153: 1697-1706, 1994.
19. Itoh, T, Storkus, W.J., Gorelik, E., and Lotze, M.T. Partial purification of murine tumor-associated peptide epitopes common to histologically distinct tumors, melanoma and sarcoma, which are presented by H-2K^b molecules and recognized by CD8⁺ tumor infiltrating lymphocytes. *J. Immunol.* 153: 1202-1215, 1994.
20. Zitvogel, L., Tahara, H., Cai, Q., Storkus, W.J., Muller G, Wolf, S.F., Gately, M., Robbins, P.D., and Lotze, M.T.

- Construction and characterization of retroviral vectors expressing biologically active human interleukin-12. *Hum. Gene Ther.* 5: 1493-1506, 1994.
21. Frassanito, M.A., Mayordomo, J.I., DeLeo, R.M., **Storkus, W.J.**, Lotze, M.T. and DeLeo, A.B. Identification of Meth A sarcoma-derived class I major histocompatibility complex-associated peptides recognized by a specific CD8⁺ cytolytic T lymphocyte. *Cancer Res.* 55: 124-128, 1995.
 22. Castelli, C., **Storkus, W.J.**, Maeurer, M.J., Huang, E., Pramanik, B. and Lotze, M.T. Mass spectrometric identification of a naturally-processed melanoma peptide recognized by CD8⁺ cytotoxic T lymphocytes. *J. Exp. Med.* 181: 363-366, 1995.
 23. Tahara, H., Zitvogel, L., **Storkus, W.J.**, Zeh, H.J. III, McKinney, T.G., Schreiber, R.D., Gubler, U., Robbins, P.D. and Lotze, M.T. Effective eradication of established murine tumors with interleukin 12 (IL-12) gene therapy using a polycistronic retroviral vector. *J. Immunol.* 154: 6466-6474, 1995.
 24. Maeurer, M.J., Martin, D.M., Castelli, C., Elder, E., Leder, G., **Storkus, W.J.**, and Lotze, M.T. Host Immune response in renal cell cancer: IL-4 and IL-10 mRNA are frequently detected in freshly collected tumor infiltrating lymphocytes. *Cancer Immunol. Immunother.* 41: 111-121, 1995.
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 28. Maeurer, M.J., Martin, D.S., **Storkus, W.J.**, Hurd, S., and Lotze, M.T. Cytolytic T cell clones define HLA-A2 restricted human cutaneous melanoma peptide epitopes: Correlation with T cell receptor usage. *Cancer J.* 1: 162-170, 1995.
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 34. Maeurer, M.J., Gollin, S.M., Martin, D., Swaney, W., Bryant, J., Castelli, C., Robbins, P., Parmiani, G., **Storkus, W.J.**, and Lotze, M.T. Tumor escape from immune recognition. Lethal recurrent melanoma in a patient associated with downregulation of the peptide transporter protein TAP-1 and loss of expression of the immunodominant MART-1/Melan-A antigen. *J. Clin. Inv.* 98: 1633-1641, 1996.
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 38. Mazzocchi, A., **Storkus, W.J.**, Traversari, C., Tarsini, P., Maeurer, M.J., Rivoltini, L., Vegetti, C., Belli, F., Anichini, A., Parmiani, G., and Castelli, C. Multiple melanoma- associated epitopes recognized by HLA-A3-

- restricted CTLs are shared by melanomas but not melanocytes. *J. Immunol.* 157: 3030-3038, 1996.
39. Bernhard, H., Maeurer, M.J., Jager, E., Wolfel, T., Karbach, J., Seliger, B., Huber, C., Storkus, W.J., Lotze, M.T., Meyer zum Buschenfelde, K.-H., and Knuth, A. Recognition of human renal cell carcinoma and melanoma by HLA-A2-restricted cytotoxic T lymphocytes is mediated by shared peptide epitopes and upregulated by interferon- γ . *Scand. J. Immunol.* 44: 285-292, 1996.
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 41. Maeurer, M.J., Zitvogel, L., Elder, E., Storkus, W.J., and Lotze, M.T. Human intestinal V δ 1+ T-cells obtained from patients with colon cancer respond exclusively to SEB, but not to SEA. *Nat. Immun.* 14: 188-197, 1996.
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 43. Maeurer, M.J., Gollin, S.M., Storkus, W.J., Swaney, W., Martin, D.M., Castelli, C., Salter, R.D., Knuth, A., and Lotze, M.T. Tumor escape from immune recognition. I. Loss of HLA-A2 melanoma cell surface expression associated with a complex rearrangement of the short arm of chromosome 6. *Clin. Cancer Res.* 2: 641-652, 1996.
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 49. Maeurer, M.J., Walter, W., Martin, D.M., Zitvogel, L., Elder, E., Storkus, W.J., and Lotze, M.T. Interleukin-7 (IL-7) in colorectal cancer: IL-7 is produced by tissues from colorectal cancer and promotes preferential expansion of tumour infiltrating lymphocytes. *Scand. J. Immunol.* 45: 182-192, 1997.
 50. Tueting, T., DeLeo, A.B., Lotze, M.T., and Storkus, W.J. Genetically-modified bone marrow-derived dendritic cells expressing tumor-associated viral or "self" antigens induce antitumor immunity *in vivo*. *Eur. J. Immunol.* 27: 2702-2707, 1997.
 51. Wilson, C.C., Tueting, T., Ma, D., Haluszczak, C., Lotze, M., and Storkus, W.J. Activation of dendritic cells by surrogate T cell interactions leads to enhanced costimulation, secretion of Th1-associated cytokines, and CTL inductive capacity. *Adv. Exp. Med. Biol.* 417: 335-343, 1997.
 52. Tueting, T., Zorina, T., MA, D.I., Wilson, C.C., De Cesare, C.M., DeLeo, A.B., Lotze, M.T., and Storkus, W.J. Development of dendritic cell-based genetic vaccines for cancer. *Adv. Exp. Med. Biol.* 417: 511-518, 1997.
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63. Wilson, C.C., Olson, W.C., Tueting, T., Rinaldo, C.R., Lotze, M.T., and **Storkus, W.J.** HIV-1-specific cytotoxic T lymphocyte responses primed in vitro by blood-derived dendritic cells and Th1-biasing cytokines. *J. Immunol.* 162: 3070-3078, 1999.
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65. Herr, W., Ranieri, E., Gambotto, A., Kierstead, L.S., Amoscato, A.A., Gesualdo, L., and **Storkus, W.J.** Identification of naturally-processed HLA-presented Epstein-Barr virus peptides recognized by *ex vivo* CD4+ or CD8+ T lymphocytes from human blood. *Proc. Natl. Acad. Sci. USA* 96: 12033-12038, 1999.
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67. Dong, X., **Storkus, W.J.** and Salter, R.D. Binding and uptake of agalactosyl immunoglobulin G by mannose receptor on macrophages and dendritic cells. *J. Immunol.* 163: 5427-5434, 1999.
68. Dong, X., An, B., Salvucci Kierstead, L., **Storkus, W.J.**, Amoscato, A. and Salter, R.D. Modification of the N terminus of a class II epitope confers resistance to degradation by CD13 on dendritic cells and enhances presentation to T cells. *J. Immunol.* 164: 129-135, 2000.
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- inhibit IL-15 and IL-2 driven differentiation of natural killer cells from early human thymic progenitors. *J. Immunol.* 166: 2194-2201, 2001.
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PUBLICATIONS: Proceedings, Invited Papers, Book Chapters

1. **Storkus, W.J.**: NK regulation of B cell development. Ph.D. Dissertation, Duke University, Copyright 1986.
2. **Storkus, W.J.**, Cresswell, P., Patterson, E.B., and Dawson, J.R.: Adenovirus inversely modulates target cell class I antigen expression and sensitivity to natural killing. In: *Immunobiology of HLA*. Vol. II: Immunogenetics and Histocompatibility, Dupont, B. (ed.). 152-155, 1988.
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CLINICAL PROTOCOLS

- UPCI 94-21** "IL-12 Gene Therapy Using Direct Injection of Tumors with Genetically Engineered Autologous Fibroblasts", Principal Investigators: Hideaki Tahara, M.D., Ph.D. and Michael T. Lotze, M.D., **Co-Principal Investigator: Walter J. Storkus, Ph.D.**
- UPCI 94-95** "Randomized Phase I Evaluation of Immunization against Melan-A/MART-1, gp100, and Tyrosinase Peptides in Patients with Metastatic Melanoma Using MF59 Adjuvant", Clinical Principal Investigators, Michael T. Lotze, M.D. and John M. Kirkwood, M.D., **Laboratory Principal Investigator, Walter J. Storkus, Ph.D.**
- UPCI 95-043** "Randomized Phase I Evaluation of Immunization against Melan-A/MART-1, gp100, and Tyrosinase Peptides in Patients with Metastatic Melanoma Using rhIL-12 as Adjuvant", Clinical Principal Investigators, Michael T. Lotze, M.D. and John M. Kirkwood, M.D., **Laboratory Principal Investigator, Walter J. Storkus, Ph.D.**
- UPCI 95-060** "Randomized Phase I Evaluation of Immunization against Melan-A/MART-1, gp100, and Tyrosinase Peptides in Patients with Metastatic Melanoma Using Autologous Dendritic Cells Cultured with IL-4 and GM-CSF", Clinical Principal Investigators, Michael T. Lotze, M.D. and John M. Kirkwood, M.D., **Laboratory Principal Investigator, Walter J. Storkus, Ph.D.**
- UPCI 99-088** "Phase I-II Study of Vaccination with Melan-A/MART-1₅₁₋₇₃ and the Multi-epitope Vaccine containing Melan-A/MART-1₅₁₋₇₃ and the Melan-A/MART-1₂₇₋₃₅ Peptides in Patients with Metastatic Measurable Melanoma", Clinical Principal Investigators, John M. Kirkwood, M.D. and Hassane Zarour, M.D., **Co-Investigator: Walter J. Storkus, Ph.D. [Active]**
- UPCI 01-171** "Randomized Phase II Evaluation of Immunization Against Tumor Cells in Patients With Metastatic Melanoma Using Autologous Mature Dendritic Cells". Clinical Principal Investigators, John M. Kirkwood, M.D., **Co-Investigator: Walter J. Storkus, Ph.D. [Active]**
- ECOG E1696** "Phase II Evaluation of Immunization Against HLA-A2 Multiepitope Vaccine Containing Melan-A/MART-1, gp100 and Tyrosinase Peptides in Patients with Metastatic Melanoma", Study Chair: John M. Kirkwood, M.D., Study Co-Chair: **Walter J. Storkus, Ph.D. [Active]**

RESEARCH

1. GRANTS RECEIVED: CURRENT SUPPORT

"Dendritic cell-based therapies designed for murine tumors"

Principal Investigator: Walter J. Storkus, Ph.D.

12% Effort

Agency: National Institutes of Health

Type: 2R01 (CA 63350, Years 5-9) Period: April 1, 1997-March 31, 2006.

Evaluation of bone marrow-derived dendritic cell-based vaccines in murine tumor models.

"Vaccine Development for Oral Carcinoma"

Co-Investigator (Project 1, Core B): Walter J. Storkus, Ph.D.

12.5% Effort

Principal Investigator (Project 3): Walter J. Storkus, Ph.D.

Program Leader: Theresa Whiteside, Ph.D.

Agency: National Institutes of Health

Type: 1P01 (DE 12321, Years 5-9) Period: February 1, 1998-January 31, 2007.

Construction and assessment of DC-based vaccines for the treatment of squamous cell carcinoma of the head-and-neck.(SCC-HN). Identification of MHC presented peptide epitopes derived from p53 protein that may serve as vaccine components and targets for immune monitoring of SCC-HN patients undergoing immunotherapy.

"Dendritic Cell Strategies to Elicit Tumor Reactive T Cells"

Principal Investigator: Walter J. Storkus, Ph.D.

10% Effort

Agency: National Institutes of Health

Type: 2R01 (CA 57840, Years 10-14) Period: May 1, 1994-April 30, 2008

Identification of multilineage tumor peptide epitopes recognized by CD4+ and CD8+ human T cells. Assessment of the immunogenicity of single or combined MHC class I- and II-presented peptide-based vaccines using dendritic cells *in vitro*. Design of clinical trials implementing defined MHC class I- and II-presented peptides and dendritic cells for the treatment of renal cell carcinoma.

"Dendritic Cell Biology and Therapy"

Co-Principal Investigator (Project 3): Walter J. Storkus, Ph.D. (with Louis D. Falo, Jr. M.D., Ph.D.) 10% Effort

Program Leaders: Olja Finn, Ph.D. and Louis D. Falo, M.D., Ph.D.

Agency: National Institutes of Health

Type: 2P01 (CA 73743, Years 6-10), Period: July 1, 1999-June 30, 2009.

Evaluation of the ability of DCs loaded with various tumor antigen formats (lysate, co-cultures, fusions) to elicit anti-tumor T cells in murine tumor models and in a phase I clinical trial for the treatment of melanoma. Evaluation of the ability of DCs to repolarize Th2-type T cell immunity to Th1-type immunity *in vitro* in patients with melanoma.

"Polarization of Dendritic Cells by CD8+ T cells"

Co-Investigator: Walter J. Storkus, Ph.D.

10% Effort

Principal Investigator: Pawel Kalinski, M.D., Ph.D.

Agency: National Institutes of Health

Type: 1R01 (CA 95128, Years 1-5), Period: July 1, 2003-June 30, 2007

This project tests the hypothesis that primed Type-1 CD8+ T cells condition DCs to become increasingly DC1-like, and in turn, these APCs may become better stimulators of Th1-type CD4+ T cell responses *in vitro*. Based on pre-clinical data derived from this project, a phase I/II clinical trial is proposed to assess this hypothesis in melanoma patients. No overlap with current submission.

"Impaired Tumoricidal Activity of DCs in HNC Patients"

Co-Investigator: Walter J. Storkus, Ph.D.

5% Effort

Principal Investigator: Nikola Vujanovic, Ph.D.

Agency: National Institutes of Health

Type: 1R01 (DE14775, Years 1-5), Period: July 1, 2002-June 30, 2007

This project has the goal to investigate the mechanisms of decreased expression of TNF family ligands by and impaired tumoricidal activity of dendritic cells (DCs) in head and neck cancer (HNC) patients, as well as the immunological consequences and reparation of these defects by simultaneous transfer of normal TNF, FasL and TRAIL genes into DCs. No overlap with current submission.

"Cytokine Gene Therapy for Cancer-Preclinical Studies"

Program Leader, Project 2 PI, Core A (Administrative) PI: Walter J. Storkus, Ph.D.

20% Effort

Agency: National Institutes of Health

Type: 1P01 (CA 100327; Years 1-5), Period: December 1, 2004-November 30, 2009.

Analysis of DC-based cytokine gene therapy of gliomas and spontaneous metastatic melanoma models in mice. Specific cytokines evaluated include: Type I IFNs (Project 1), IL-12 (Project 2) and IL-18, IL-1H4, IL-23 and IL-27 (Project 3).

"Combinational Immunotherapies Targeting Tumor RTKs"

Principle Investigator: Walter J. Storkus, Ph.D.

15% Effort

Agency: National Institutes of Health

Type: 1P01 (CA 114071-01; Years 1-5), Period: April 1, 2005-March 30, 2010.

Evaluation of RTK overexpression and the ability of ligand agonists and PTP inhibitors to promote their proteasomal degradation and enhanced recognition by T cells in the setting of renal cell carcinoma (RCC). Performance of a phase I clinical trial incorporating DC/RTK peptide-based vaccination and anti-RTK Ab therapy in patients with accessible metastatic RCC.

2. GRANTS RECEIVED: PREVIOUS SUPPORT AS PI

“Immunobiology of Atypical Nevi”

Principal Investigator: Walter J. Storkus, Ph.D.

Agency: National Institutes of Health

Type: 1R01 (CA 82297, Years 1-5) Period: July 1 1999-April 30, 2004.

Analysis of immune function and specificity in pre-malignant nevi. Evaluation of T cell and dendritic cell infiltration and functional status as correlated with the degree of atypia in situ. Analysis of the expression of melanoma-associated antigens during the course of disease progression and the in situ immune response in melanoma patients at high-risk for recurrence.

“Phase I Clinical Trials of Melanoma Peptide-Based Vaccines”

Principal Investigator: Walter J. Storkus, Ph.D.

Agency: Cancer Research Institute

Type: Period July 1, 1995-June 30, 1999.

Evaluation of peptide-pulsed dendritic cells (DC) as vaccines to promote anti-melanoma reactive CD8+ T cells.

3. PATENTS (AWARDED/Submitted)

“Elution And Identification of T Cell Epitopes From Viable Cells”, Inventors: **Walter J. Storkus, Ph.D.** and Michael T. Lotze, M.D., A method to isolate and identify T cell epitopes., U.S. Patent Number 5,989,565 (Issued 11/23/99).

“Methods for isolation and use of T cell epitopes eluted from viable cells in vaccines for treating cancer patients”, Inventors: **Walter J. Storkus, Ph.D.** and Michael T. Lotze, M.D., A method to construct cancer vaccines based on T cell epitopes eluted from viable tumor cells, U.S. Patent Number 6,077,519 (Issued 6/20/00).

“EphA2 Peptide Epitopes and Uses Therefor”, Inventor: **Walter J. Storkus, Ph.D.** and Michael S. Kinch, Ph.D. Use of molecularly-defined EphA2 peptides for the treatment of patients with cancer. Patent Pending.

“Identification of an IL-13 Receptor Alpha2 Peptide Analogue Capable of Enhancing Stimulation of Glioma-Specific CTL Responses”. Co-Inventor: **Walter J. Storkus, Ph.D.** Provisional Patent Submitted.

4. SEMINARS AND INVITED LECTURESHIPS RELATED TO RESEARCH: (RECENT INVITED TALKS, GIVEN 1999-2004)

Perspectives in Melanoma III, New Orleans, LA, March 18, 1999. Title: “**Induction of cellular immune responses using adjunctive therapy for the prevention of melanoma relapse**”.

Oncology Grand Rounds, New York University, New York City, NY, April 5, 1999. Title: “**Cancer Immunotherapy: Preclinical and clinical studies of dendritic cell-based vaccines**”.

International Workshop “Immunology of Ocular Tumors”, Ettal, Germany, April 8-9, 1999. Title: “**Dendritic APC pulsed with peptide/protein tumor antigens as vaccines**”.

First International Kidney Cancer Symposium, Chicago, IL, October 1-3, 1999. Title “**Dendritic Cells in RCC**”.

14th International Convocation on Immunology. Cancer Immunotherapy: Pitfalls/Solutions. Amherst, NY, October 8-11, 1999. Title: “**Tumor Antigens and Dendritic Cell-Based Therapy**”.

Second Course on Immunotherapy and Gene Therapy of Cancer: Experimental basis and Clinical Applications, Hospital Clinico Universitario, Zaragoza, Spain. November 9-12, 1999. Title: **"Dendritic Cells and their Clinical Application to Cancer Vaccines"**.

IX Congresso Nazionale, Societa Italiana di Urologia Oncologia. "Tumori Del Rene E Surrene". Sheraton Nicolaus Hotel, Bari, Italy, November 28-30, 1999. Title: **"Immunotherapy of Renal Cell Carcinoma: Basic Concepts"**.

2nd Annual Walker's Cay Colloquium on Cancer Vaccines and Immunotherapy, Walker's Cay Resort, Abaco, Bahamas, March 8-11, 2000. Title: **"Epitope Spreading and Objective Clinical Responsiveness to Tumor Peptide-Based Vaccines"**.

Melanoma Consensus Conference. Four Seasons Hotel, Atlanta, GA, April 7-9, 2000. Title: **"Future Directions: Basic Science Issues"**.

Perspectives in Melanoma IV. State of the Art at the Turn of the Century. The Pittsburgh Hilton, Pittsburgh, PA, June 1-2, 2000. Title: **"Melanoma Antigens Recognized by CD8+ T cells"**.

Integrated Therapeutics Group "Advances in Melanoma Management" Investigator's Meeting, Sheraton Chicago Hotel and Towers, Chicago, IL, October 19-22, 2000. Title: **"Overview of peptide vaccine trials"**.

The Chicago Association of Immunologists, Amour Academic Facility at Rush-Presbyterian St. Luke's Medical Center, Chicago, IL, November 7, 2000. Title: **"Dendritic Cell Subsets and Immunotherapy"**.

Immunology Seminar Series, Roswell Park Cancer Institute, Buffalo, NY, November 14, 2000. Title: **"DC Subsets and Epitope Spreading: Critical Issues in Cancer Vaccines"**.

Combined Immunology/Cancer Center Seminar Series, Indiana University, Indianapolis, IN, December 20, 2000. Title: **"DC Precursor Mobilization and In Situ Maturation as an Approach for Cancer Immunotherapy"**.

Biochemistry and Molecular Biology Seminar Series, Purdue University, W. Lafayette, IN, January 22, 2001. Title: **"DC subsets, Epitope Spreading and Clinical Responsiveness to Cancer Vaccines"**.

5th World Conference on Melanoma, San Georgio Island, Venice, ITALY, February 28-March 3, 2001. Title: **"Epitope Spreading in Melanoma Patients"**.

3rd Annual Walker's Cay Colloquium on Cancer Vaccines and Immunotherapy, Walker's Cay Resort, Abaco, Bahamas, March 7-10, 2001. Title: **"Epitope Spreading in Cancer Vaccines"**.

Immune Monitoring Workshop, Society of Biological Therapy, Co-Chair and Discussant in **"Tetramer Analyses"** Working Group Session, Natcher Center, NIH, Bethesda, MD, November 8, 2001.

Annual Meeting of the Society of Biologic Therapy, Co-Chair and Speaker in "Vaccine/Dendritic Cells" Concurrent Session, Natcher Center, NIH, Bethesda, MD, November 9, 2001. Title: **"Th1/Th2 Responses in RCC and Melanoma"**.

5th Annual Cancer Center Consortium Meeting, Marriott Downtown, Cleveland, OH, February 21-23, 2002. Title: **"Autoimmunity, Epitope Spreading and Cancer Therapy"**.

4th Annual Walker's Cay Colloquium on Cancer Vaccines and Immunotherapy, Walker's Cay Resort, Abaco, Bahamas, March 6-9, 2002. Title: **"CD4+ T cell responses in melanoma/RCC and DC-based repolarization"**.

Immunology Council Meeting, The Johns Hopkins University, Baltimore, MD, March 18th, 2002. Title: **"Disease-Associated Bias in CD4+ T-helper Responses to Tumor Antigens in RCC and melanoma"**.

Simmons/Billiar Research Conference, Department of Surgery, University of Pittsburgh, Pittsburgh, PA, August 26th, 2002. Title: **“Disease-Stage Dependent Deviation in the Anti-Tumor Th Response”**.

CME Course on Innovations in Oncology, University of Pittsburgh, Pittsburgh, PA, September 13th, 2002. Title **“Melanoma Vaccines: Progress and Potential”**.

Oral Cancer Center Seminar Series, University of Pittsburgh, Pittsburgh, PA, November 29th, 2002. **“CD4+ T cell Dysfunction in Patients with Cancer”**.

Cleveland Clinic Immunology Seminar, Cleveland Clinic Foundation, Cleveland, OH, April 10th, 2003. **“CD4+ T Cell Immune Dysfunction in Patients with RCC and Corrective Immunotherapy”**.

The First Melanoma Research Conference, Wydham Franklin Plaza Hotel, Philadelphia, PA, June 21-24, 2003. **“Repolarizing Anti-Melanoma Th Responses”**.

Perspectives in Melanoma VI, Sheraton Bal Harbour Beach Resort, Miami, FL, November 13-14, 2003. **“Melanoma induced deviation in CD4+ T helper cell functional polarization”**.

Cleveland Clinic Oncology Grand Rounds, Cleveland Clinic Foundation, Cleveland, OH, January 28th, 2004. **“Combinational Immunotherapies Targeting RTKs”**.

1st International Congress on Kidney and Bladder Cancer, Ritz-Carlton Hotel, Orlando, FL, August 15th, 2004. **“T Cell Responses to Tumor Associated Antigens”**.

Interdisciplinary Graduate Program in Immunology Seminar Series, University of Iowa, Iowa City, IA, September 15th, 2004. **“RTKs as targets for immune intervention in cancer: An EphA2 Model”**.

Cytokines in Cancer and Immunity, Joint Meeting of International Cytokine society and International Society for Interferon and Cytokine Research, Hilton Caribe Hotel, San Juan, PR, October 21-25, 2004. Title: **“ IL-12 Family Cytokine Gene Therapy of Cancer”**.

The Third International Kidney Cancer Symposium, Palmer House Hilton, Chicago, IL, November 12-14th, 2004. Title: **“RCC Antigens and the Immune Response”**.

Dana Farber/Harvard Cancer Center Renal Cancer Program and Renal Cancer SPORE Minisymposium, Jimmy Fund Auditorium, Boston, MA, March 31, 2005. Title: **“Combination immune targeting of receptor tyrosine kinases (RTKs) in renal cell carcinoma”**.

5. OTHER RESEARCH-RELATED ACTIVITIES:

1986-Present	Ad-Hoc Journal Review: <i>The Journal of Immunology</i> , <i>Nature</i> , <i>Human Immunology</i> , <i>The International Journal of Cancer</i> , and <i>The Journal of Immunotherapy</i> , <i>Cancer Research</i> , <i>Science</i> , <i>Blood</i> , <i>Immunity</i> , <i>Science</i> and <i>Nature Medicine</i> .
1991-Present	Member, Pittsburgh Cancer Institute/University of Pittsburgh Cancer Institute.
1994-Present	Member, Editorial Board for the journal <i>Natural Immunity</i> .
1995	Member, NCI Special Review Study Section (RFA CA 94-08), Title: National Cooperative Drug Discovery Groups, Bethesda, MD., January 24-26, 1995.
1994-1996	Ad-Hoc Reviewer for Grants submitted to the Dutch Cancer Society, the Israeli Science Foundation, and the National Science Foundation (U.S.).
1996	Member, NCI Special Review Study Section (RFA CA 95-17), Title: Cancer Therapy with Biologic Response Modifiers (CATBRM), Bethesda, MD, June 11-13, 1996.
1999-2003	Member, Experimental Immunology Study Section, NIH.

2000 NIH GCRC Site Visit, University of Chicago, April 11-12, 2000.

2000 NIH Program Project Site Visit, University of Pennsylvania, NCI-C GRB-2 (E3), June 24-26, 2000.

2000 Department of Defense (DOD) Prostate Cancer Research Program Grant Review, Vienna, VA, July 6-8, 2000.

2000 NIH Center for Scientific Review, Special Emphasis Panel, ZRG1 ET-1 (02), July 07, 2000.

2000 NIH Experimental Therapeutics-2; Ad Hoc Reviewer, October 23-25, 2000.

2001 External Advisor for the University of Chicago's NIH grant PO1 CA 74182 (Hans Schreiber, Program Leader), November 7, 2000.

2001-2003 Scientific Advisory Board Member, Vaccinex, Inc. (Rochester, NY).

2002 External Advisor to Cervical Cancer SPORE, University of Alabama-Birmingham (Dr. Ronald D. Alvarez, SPORE Director).

2002-Present Co-Program Organizer for "Tumor Immunology and Immunotherapy" Block for AAI annual meeting 2002.

2002-Present Section Editor, *The Journal of Immunology*

2002 NCI-CCSG Site Visit Member, Wistar Institute (Kaufman), February 24-26, 2003.

2003 NIH Ad-Hoc Reviewer for ZRG1 SSS-F (02) SEP. August 5, 2003.

2003 NIH Ad-Hoc Reviewer for ZAI1 PTM-1 (J3) "Innovative Grants on Immune Tolerance". November 10-12, 2003.

2003 Ad-Hoc Reviewer for Grant Applications submitted to the Melanoma Research Foundation, November 20, 2003.

2003 NIH Ad-Hoc Reviewer for ZRG1 DT-02 SEP. November 24, 2003.

2003 Editor (Basic Science), *Melanoma Research*

2004 NIH Program Project Site Visit, University of Pennsylvania, NCI-C GRB-1 (MC), P01 CA 109095-01, El-Deiry, February 23-25, 2004.

2004-2006 Member, NCI's Biological Resource Branch Oversight Committee (BRB/OC).

2004-present External Advisor to Breast Cancer SPORE, Fox Chase Cancer Center, (Dr. Jose Russo, SPORE Director).

2004 NCI-CCSG Site Visit Member, University of North Carolina, Chapel Hill, NC, May 24-26, 2004.

2004 Ad Hoc Reviewer for Grant Applications submitted to the Melanoma Research Foundation, September 21, 2004.

2004 Ad-Hoc Reviewer for NIH TTT Immunology IRG, October 28-29, 2004.

2004-2006 Member, NIH Parent Sub-Committee C

2005 Ad-Hoc Reviewer for NCI P01 Experimental Therapeutics B, June 6-7, 2005.

SERVICE

1. UNIVERSITY AND MEDICAL SCHOOL

1986-1991 Post-Doctoral Representative to Divisional Post-Doctoral Admissions Committee, Dept. Microbiology and Immunology, Duke University, Durham, NC.

1992-1993 Ad-Hoc Reviewer. Institutional American Cancer Society Awards (PCI).

1993-1994 Ad-Hoc Reviewer. Competitive Medical Research Fund (Presbyterian Hospital).

1993-2000 Member, University of Pittsburgh ACS Institutional Grant Review Board.

1996-2000 Member, Program in Immunology, Immunology Curriculum Committee.

1996-2000 Member, UPCI Health Sciences Research Committee.

2000 Organized UPCI Biologic Therapy Retreat, June 19, University of Pittsburgh Johnstown Campus, The Living/Learning Conference Center, Johnstown, PA.

2001-2003 Member, Standing Committee for Tenured Faculty Promotions and Appointments, School of Medicine, University of Pittsburgh, Pittsburgh, PA.

2002-present Member, Molecular Medicine Institute of the University of Pittsburgh, Pittsburgh, PA.

2003-present Co-Director, Cancer Program of the Molecular Medicine Institute of the University of Pittsburgh, Pittsburgh, PA.

2. TEACHING

1986-1990	Teaching assistant for First Year Graduate Student Immunology Course, Fall Semester, Dept. of Microbiology and Immunology, Duke University.
Fall 1992	Comprehensive Immunology (MSMIC 2360). Dr. C. Milcarek organizer. 2 Lectures, "NK cells" and "Mechanisms of Cytolysis".
Spring 1993	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Dr. B. Rabin organizer. 1 Lecture, "T lymphocytes". Course facilitator for problem based learning cases.
Spring 1993, 1994.	Immunology and Human Disease (MSMIC 2220). Dr. O. Finn, organizer. 1 Lecture, "Tumor Antigens".
Fall 1993-1996	Cell structure and Function (MSNAC 2152). Dr. C. C. Widnell organizer. 2 Lectures, "Non-adaptive Immunity" and "T-cell Differentiation".
Spring 1994	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Dr. B. Rabin organizer. 2 Lectures, "The Major Histocompatibility Complex" and "Antigen-Presenting Cells". Course facilitator for problem based learning cases.
Spring 1995	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Dr. B. Rabin organizer. 1 Lecture, "Molecular Basis of T cell Antigen Recognition and Activation".
Fall 1995	Comprehensive Immunology (MSMIC 2360). Drs. C. Milcarek and S. McCarthy co-organizers. 4 Lectures, "Antigen Processing I/II" and "NK Cells I/II".
Spring 1996	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Dr. B. Rabin organizer. 1 Lecture, "Molecular Basis of T cell Antigen Recognition and Activation". Course facilitator for problem based learning cases.
Spring 1997	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Dr. B. Rabin organizer. 2 Lectures.
Fall 1999	Contemporary Topics in Immunology (MSIMM 3220). Co-Course Director (Lou Falo, M.D., Ph.D., Co-Director) Semester Topic: Dendritic Cells: Biology and Function, 15 sessions.
Spring 2000, 2001	Immunology of Human Disease (MSIMM 3230), Title "Tumor antigens and vaccines".
Spring 2002	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Drs. R. Duquesnoy and M. Shurin organizers. 1 Lecture: "T-cell Receptor, MHC, Antigen Processing and Presentation", January 3, 2002.
Fall 2002	Immunology of Human Disease (MSIMM 3230), Title "Tumor antigens", November 8, 2002.
Spring 2003	First Year Medical School Immunology Block, <u>Infection and Inflammation</u> . Drs. R. Duquesnoy and M. Shurin organizers. 1 Lecture: "T-cell Receptor, MHC, Antigen Processing and Presentation", January 2, 2003.
Spring 2004	Immunology of Human Disease (MSIMM 3230), Title "Tumor antigens", March 26, 2004.

TEACHING (Committee Work/Research Supervision)

Pre-Doctoral:

1993-1995	Chairman, Ph.D. Thesis Committee for Mr. Matt Tector (Pathology), graduated with Ph.D. 5/95.
1994	Member, Comprehensive Exam Committee for Mr. Andrew Nowalk (MGB).
1995	Supervisor, Summer Laboratory Internship by U. Pittsburgh Medical School Student Mr. Thomas Zavoral.
1996	Member, Comprehensive Exam Committee for Dr. Ira Berman, M.D. (MGB), graduated 6/98.
1996-1997	Member, M.S. Thesis Committee for Mrs. Amy Mank-Seymour (GSPH), graduated 3/97.
1996-1997	Member, Ph.D. Thesis Committee for Mr. Mark Alter (MGB), graduated 6/97.
1996-1998	Member, Ph.D. Thesis Committee for Ms. Lian Zheng (GSPH), graduated 5/98.
1999-2002	Member, Ph.D. Thesis Committee for Ms. Melina Soares (MGB), graduated 8/02.
1999-2002	Member, Ph.D. Thesis Committee for Ms. Anda Vlad (MGB), graduated 10/02.
1998-2002	Member, Ph.D. Thesis Committee for Ms. Kendra Bodner (MVM), graduated 1/02.
1999-present	Member, Ph.D. Thesis Committee for Ms. Bonnie Colleton (GSPH).
1998	Chair, Comprehensive Exam Committee for Mr. Jayakar Nayak (IMM).
1997-2001	Member, Comprehensive Exam Committee and M.S. Thesis Committee for Ms. Cecilia

Vasquez, graduated 3/01.

2000-2002 Member, Comprehensive Exam Committee and Ph.D. Thesis Committee for Ms. Lori Stolinski /Spencer (IMM), graduated 2/02.

1999-present Ph.D. Supervisor of Mr. Lazar Vujanovic (IMM), expected 12/05.

2000-present Co-Supervisor of Ph.D. Candidate Ms. Anna Kalinska (University of Amsterdam).

2000 Chairman, Comprehensive Exam Committee for Ms. Jessica Kettel (IMM), graduated 8/03.

2000-present Ph.D. Supervisor of Mr. Aklile Berhanu (IMM), expected 7/05.

2000-2004 Ph.D. Supervisor of Mr. Dominic Warrino (IMM), graduated 3/04.

2000-2004 Ph.D. Supervisor of Mr. Christopher Herrem (IMM), graduated 6/04.

2000-present Member, Comprehensive Exam Committee and Ph.D. Thesis Committee for Ms. Bridget Colvin (IMM), graduated 12/04.

2000-2002 Member, Ph.D. Thesis Committee for Mr. Paul Hu (IMM), graduated 6/02.

2001 Chairman, Comprehensive Exam Committee for Mr. Nehad Alajez (IMM), graduated 10/03.

2001-present Member, Ph.D. Thesis Committee for Mr. David Hokey (IMM).

2002-2005 Member, Comprehensive Exam Committee and Ph.D. Thesis Committee for Mr. Timucin Taner (IMM), graduated 2/05.

2002-present Ph.D. Supervisor of Mrs. Jian Huang (IMM), expected 8/05.

2002 Member, Comprehensive Exam Committee for Ms. Pamela Beatty (IMM), Ms. Casey Carlos (IMM), Ms. Kavitha Rao (IMM).

2004-present Ph.D. Supervisor of Mrs. Mayumi Kawabe (IMM).

Post-Doctoral:

1992-1994 Co-supervisor, Post-Doctoral Research for Drs. Tohru Itoh (M.D., Dept. Surgery) and Markus Maurer (M.D., Dept. Surgery). Currently Assistant Professor of Surgery, University of Osaka, JAPAN and Associate Professor of Dermatology, University of Mainz, GERMANY, respectively.

1992-1995 Co-supervisor, Post-Doctoral Research for Dr. Jose I. Mayordomo (M.D., Dept. Surgery) and Dr. Laurence Zitvogel (M.D., Dept. Surgery). Currently Associate Professor of Medical Oncology, University of Zaragoza, SPAIN and Associate Professor of Medicine, Institut Gustave Roussy, Villejuif, FRANCE, respectively.

1995-1998 Co-supervisor, Post-Doctoral Research for Dr. Bettina Couderc (Ph.D., Dept. Molecular Genetics and Biochemistry). Currently Assistant Professor of Pharmaceutical Sciences, University of Toulouse, FRANCE.

1996-1999 Supervisor, Post-Doctoral Research for Dr. Thomas Tueting (M.D., Dept. Surgery). Currently Associate Professor of Dermatology, University of Berlin, GERMANY.

1997-2000 Supervisor, Post-Doctoral Research for Dr. Lisa Salvucci Kierstead (Ph.D., Dept. Surgery). Currently Staff Scientist, Merck & Co., Wayne, PA, USA.

1998-1999 Supervisor, Post-Doctoral Research for Dr. Loreto Gesualdo (M.D., Dept. Surgery). Currently Associate Professor of Nephrology, University of Bari, ITALY.

1998-2000 Supervisor, Post-Doctoral Research for Dr. Wolfgang Herr (M.D., Dept. Surgery). Currently Assistant Professor of Surgery, University of Mainz, GERMANY.

1998-2001 Supervisor, Post-Doctoral Research for Dr. Elena Ranieri (Ph.D., Dept. Surgery). Currently Associate Professor of Nephrology, University of Foggia, ITALY.

1998-2002 Supervisor, Post-Doctoral Research for Dr. Jan Mueller-Berghaus (M.D., Dept. Surgery). Currently Assistant Professor of Laboratory Medicine, University of Mannheim, GERMANY.

1999-2001 Supervisor, Post-Doctoral Research for Dr. Pia Bjorck (Ph.D., Dept. Dermatology). Currently Assistant Professor of Medicine, Stanford University, Stanford, CA, USA.

2001-2004 Supervisor, Post-Doctoral Research for Dr. Eva Pizzoferrato (Ph.D., Dept. Surgery). Currently Instructor of Medicine, University of Pittsburgh.

2001-2003 Supervisor, Post-Doctoral Research for Dr. Tomohide Tatsumi (M.D., Ph.D., Dept. Surgery). Currently Assistant Professor of Molecular Therapeutics, Osaka University School of Medicine, JAPAN.

2002-2004	Supervisor, Post-Doctoral Research for Dr. Amy Wesa (Ph.D., Dept. Surgery). Currently Instructor, Department of Dermatology, University of Pittsburgh.
2005-present	Supervisor, Post-Doctoral Research for Dr. Hideo Komita (Ph.D., Dept. Dermatology).